REMARKS/ARGUMENTS

Reconsideration and continued examination of the above-identified application are respectfully requested.

The amendment to the claims further defines what the applicants regard as the invention. Full support for the amendment can be found throughout the present application, for instance, at pages 4, 5, and 8. Accordingly, no questions of new matter should arise and entry of the amendment is respectfully requested.

Claims 1-14 are pending in the application. Claims 9-14 have been withdrawn as the result of an earlier restriction requirement.

At page 2 of the Office Action, the Examiner rejects claims 1 and 2 under 35 U.S.C. §103(a) as being unpatentable over Rothbuhr et al. (U.S. Patent No. 4,636,375). According to the Examiner, Rothbuhr et al., at col. 8, describes treating carbon black off-gas to remove water and carbon, and then recycling the treated off-gas. The Examiner acknowledges that Rothbuhr et al. does not explicitly teach heating before recycling. However, the Examiner states that Rothbuhr et al., at col. 9, suggests that it would be obvious to heat the off-gas prior to recycling the off-gas to increase the carbon black yield, and/or efficiency of combustion. The Examiner also states that a fuel rich mode is suggested as an option in Rothbuhr et al., at columns 1 and 2. For the following reasons, this rejection is respectfully traversed.

Claim 1 of the present application recites a furnace carbon black producing process wherein off-gas from a carbon black furnace is dewatered and heated, following substantial removal of carbon black therefrom, and fed as a combustion gas feed stream to a burner portion of the same or

a different carbon black furnace, wherein the carbon black is produced by a fuel rich process.

It is important for the Examiner to understand that Rothbuhr et al. relates to a fuel lean process whereas the claimed invention relates to a fuel rich process. According to the present application, and more specifically at pages 4 and 8, a fuel rich environment exists when the amount of oxidant gas feed stream, which is combined with the combustion gas feed stream, is less than eighty percent (80%) of the amount required to completely combust the combustible components of the combustion gas feed stream. In other words, the oxidant gas stream provides oxygen in an amount less than eighty percent (80%) of stoichiometric oxygen. Furthermore, it is important for the Examiner to understand that it is a common practice to define the stoichiometric ratio of oxygen and fuel, when dealing with fuel rich processes, or clearly state that the process is a fuel rich process. In fact, when the stoichiometric ratio of oxygen and fuel is not defined and the document does not explicitly state that the process is a fuel rich process, it is a construed by one skilled in the art that the process is a fuel lean process.

Rothbuhr et al., at column 1, lines 45-48, states that "[t]he fuel gas required for energy production (or some other fuel) is mostly employed in such volumes, related to the volume of oxygen introduced with the combustion air, that it is present in deficiency." One skilled in the art by reading Rothbuhr et al., at col. 1, lines 45-48, would clearly understand that it is the fuel gas that is present in deficiency. Thus, the process described at col. 1, lines 45-48, is a fuel lean process, which teaches away from the claimed invention.

Rothbuhr et al., at col. 1, lines 49-52, also states that "...it is one of the principles of the furnace black process that the volume of oxygen is used in deficiency relative to the fuel and carbon

black raw material volume." (Emphasis added) In other words, the volume of oxygen is less than the combined volume of fuel and carbon black raw material. If the volume of oxygen is equal to or more than the combined volume of fuel and carbon black raw material, the oxygen would completely burn the carbon black raw material and the process would not result in production of a carbon black. The statement at col. 1, lines 49-52 does not indicate that the volume of oxygen is less than the volume of fuel, by itself. In fact, one skilled in the art, by reading Rothbuhr et al., at col. 1, lines 49-52, in view of Rothbuhr et al., at col. 1, lines 45-48, would conclude that the amount of oxygen is more than the amount of fuel, but not more than the combined amount of fuel and carbon black raw material.

In addition, Rothbuhr et al., at col. 1, lines 53-56, states that "...whenever as little as possible air-oxygen is to come into contact with the carbon black raw material and is to burn the latter, as high volumes as possible as fuel gas are used." The statement at col. 1, lines 52-56, on its face, seems to indicate a trend to run a process wherein the amount of fuel reaches or approaches stoichiometric. However, although col. 1, lines 52-56, indicates an increase in the amount of fuel, according to Rothbuhr et al., at col. 1, lines 58-62, the amount of fuel cannot be greater than the amount of oxygen because such a process would damage the liner of the reactor.

Further, Rothbuhr et al., at col. 1, lines 56-58, states that "[a] 60-70% turnover of the air-oxygen with the fuel gas is a value quite customary in practice." One skilled in the art by reading Rothbuhr et al., at col. 1, lines 56-58, would clearly understand that a "60-70% turnover of the air-oxygen" indicates that 60-70% of the amount of oxygen is used to burn the fuel. Thus, the process is a fuel lean process. Furthermore, as indicated above, Rothbuhr et al. teaches away from having a

fuel rich process by stating, at col. 1, lines 58-62, that a high amount of fuel leads to higher temperature loads, which can destroy the inner liner of the reactor. For the reasons set forth above, Rothbuhr et al. at col. 1, lines 45-63, clearly describes a fuel lean process.

Moreover, Rothbuhr et al., at cols. 7 and 8, further emphasizes the production of carbon black using a <u>fuel lean</u> process by stating that the process includes an air volume constant of 27 Nm^3/h and a natural gas constant of 1.9 Nm^3/h. One skilled in the art would recognize that an air volume constant of 27 Nm^3/h and a natural gas constant of 1.9 Nm^3/h relates to a fuel lean process.

Since the claimed invention relates to a process using a fuel rich process and Rothbuhr et al. uses a fuel lean process, the claimed invention is not taught or suggested.

Accordingly, the rejection under 35 U.S.C. §103(a) over Rothbuhr et al. should be withdrawn.

At page 2 of the Office Action, the Examiner rejects claims 1 and 2 under 35 U.S.C. §103(a) as being unpatentable over Stokes (U.S. Patent No. 2,672,402), alone or in view of Rothbuhr et al. The Examiner asserts that Stokes, at cols. 2 and 3, describes removing carbon and water from carbon black off-gas and recycling the carbon black off-gas. Furthermore, the Examiner asserts that Stokes describes the injection of oxygen. The Examiner acknowledges that Stokes differs from the claimed invention in that Stokes does not teach or suggest heating the dewatered gas. However, the Examiner asserts that heating the dewatered gas would be an obvious measure to maintain the temperature, in view of maintaining a favorable equilibrium as well as maintaining a hot combustion zone for efficient burning and carbon formation. Furthermore, the Examiner states that Rothbuhr et al., at cols. 9 and 10, describes that efficiency is gained by preheating the infeeds.

Thus, the Examiner concludes that preheating is an obvious measure to improve economic efficiency. Additionally, the Examiner states that Stokes, at col. 3, lines 50-55, describes the fuel rich mode. For the following reasons, this rejection is respectfully traversed.

The arguments set forth above with respect to Rothbuhr et al. apply equally here. In summary, Rothbuhr et al. teaches away from the claimed invention by describing a fuel lean process. As the Examiner appreciates, Stokes does <u>not</u> teach or suggest dewatering <u>and</u> <u>heating</u> the off-gas from a carbon black furnace, prior to "recycling" the off-gas. The advantages of preheating are discussed, for instance, at pages 7-9 of the present application. In accordance with the claimed invention, preheating the off-gas generates higher yields of carbon black at a given surface area and better production economics. Furthermore, according to Stokes, its process results in an increase in the yield of carbon black and in a production of a valuable gaseous product. Thus, one skilled in the art by reading Stokes, which asserts that its process increases the yield of carbon black, would not be motivated to look to other references since the process of Stokes already increases the yield of carbon black.

Furthermore, even if one skilled in the art could refer to such an old document as Stokes et al. when attempting to produce an improved process, Stokes simply does not teach or suggest the use of a heating step during the recycling procedure.

With respect to the Examiner's argument that Stokes, at col. 3, lines 50-55, describes a fuel rich mode, the Examiner is misinterpreting Stokes. According to Stokes, at col. 3, lines 50-55, "[o]xygen is supplied in a ratio of about two volumes of make material to about one volume of oxygen." This statement means that the process of Stokes includes about two times as much carbon

black making raw material as oxygen. At best, one could argue that the the term "make material" includes both fuel and carbon black make material. However, it would be clear to one skilled in the art that "make material" is not fuel, by itself. Stokes does not teach or suggest that the amount of fuel is greater than the amount of oxygen. Accordingly, the rejection under 35 U.S.C. §103(a) over Stokes alone or in view of Rothbuhr et al. should be withdrawn.

At page 2 of the Office Action, the Examiner rejects claims 3 and 8 under 35 U.S.C. §103(a) as being unpatentable over Stokes alone or with Rothbuhr et al. and further in view of Sircar (U.S. Patent No. 5,240,472) and Doshi (U.S. Patent No. 4,690,695). The Examiner asserts that Stokes describes removal by adsorption in general. However, Stokes does not specify pressure swing absorption (PSA). However, the Examiner states that Sircar, at col. 5, line 55, describes using PSA to dewater a gas. Thus, the Examiner concludes that it would be obvious to use the water removal system of Sircar in Stokes. With respect to claim 8, the Examiner acknowledges that Stokes does not identify the source of oxygen; however, the Examiner states that Doshi, at col. 11, line 5, describes that its process can separate oxygen by PSA. Thus, the Examiner concludes that using oxygen from any source, such as PSA, is an obvious expedient to create the oxygen used by Stokes. For the following reasons, this rejection is respectfully traversed.

The arguments set forth above with respect to Stokes and Rothbuhr et al. apply equally here. According to Stokes, the tail gas contains large quantities of CO and H_2 contaminated only with relatively small amounts of CO_2, water vapor, and decomposed hydrocarbon, each of which can be removed from the CO and H_2 by convenient and inexpensive steps. Sircar relates to the removal of water from an air stream wherein water and CO_2 are removed in a pretreatment system and then the

air stream is cryogenically fractionated into its components. Sircar does not all relate to carbon black processes and therefore is non-analogous art. Further, Sircar, at col. 5, lines 52-56, states that residual water and carbon dioxide can be removed from a nitrogen containing gas stream, such as air, by methods such as PSA. Given that Sircar specifically recites that PSA is used to remove residual water in a nitrogen containing gas and according to Stokes, its tail-gas does not include a nitrogen, one skilled in the art would not be motivated to combine the teachings of Sircar with Stokes to remove the water vapor of Stokes by PSA.

With respect to Doshi, this patent relates to a permeable membrane for initial bulk gas separations which makes use of a pressure swing adsorption system. From a reading of Doshi, there is no teaching or suggestion of using this system in the manufacturing of carbon black. Accordingly, Doshi is non-analogous art with respect to the claimed invention and furthermore, one skilled in the art would not look to Doshi and combine it with the production of carbon black patents relied upon by the Examiner, including Stokes and/or Rothbuhr et al. The only motivation one would have for applying this technology to carbon black would be through the use of hindsight or an obvious to try standard which are both improper for purposes of determining patentability.

Further, claim 8 is dependent on claim 1; therefore, the arguments set forth above with respect to the patentability of claim 1 apply equally here. Accordingly, the rejection under 35 U.S.C. § 103(a) over Stokes alone or with Rothbuhr et al. and further in view of Sircar and Doshi should be withdrawn.

At page 3 of the Office Action, the Examiner rejects claims 4-7 under 35 U.S.C. §103(a) as being unpatentable over Stokes alone or in view of Rothbuhr et al. and further in view of Lynum et

al. (U.S. Patent No. 5,527,518). The Examiner asserts that Stokes and Rothbuhr et al. do not explicitly teach reheating the recycled gas using plasma heating. However, according to the Examiner, Lynum et al., at col. 5, teaches reheating the recycled gas using plasma heating to make carbon blacks. Thus, the Examiner concludes that plasma preheating the gases of Stokes would be obvious to assure efficient combustion and restore heat lost during the water-removal steps. For the following reasons, this rejection is respectfully traversed.

The arguments set forth above with respect to Stokes alone or in view of Rothbuhr et al. apply equally here. Lynum et al. relates to passing a preheated feedstock of methane and/or natural gas through a plasma torch to cause a pyrolytic decomposition of the feedstock. Thus, Lynum et al. does <u>not</u> teach or suggest recycling the off-gas, and further plasma heating the off-gas which has been preheated to a certain degree via a suitable heat exchanger. According to Lynum et al., a plasma torch increases the temperature of the feedstock to over 1600° C, which is the decomposition temperature for the raw material. This temperature is too high to be used for preheating the feedstock. Lynum et al. does not teach that the gases transported in a return pipe to the torch are preheated. Thus, one skilled in the art, by reading Lynum et al., would not use a plasma torch to <u>preheat</u> a recycled feedstock of Stokes, or heat an oxidant gas feed stream, preheat the combustion gases produced in a burner portion of the same or a different carbon black furnace. Instead, one skilled in the art, by reading Lynum et al. in view of Stokes, would conclude that a plasma torch is only used to decompose the feedstock instead of preheating the feedstock.

Accordingly, one skilled in the art, by reading Stokes alone or in view of Rothbuhr et al. and in view of Lynum et al., would not select the elements from the three references for

combination in a manner claimed by the applicants. The only way this rejection can be made is by the improper use of hindsight and/or the improper use of an obvious to try standard, or the manipulation of the references in a manner not taught or suggested by the references. Accordingly, this rejection should be withdrawn.

The Examiner is respectfully requested to contact the undersigned by telephone should there be any remaining questions as to the patentability of the pending claims.

CONCLUSION

In view of the foregoing remarks, the applicants respectfully request reconsideration of this application, and the timely allowance of all the pending claims.

If there are any other fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 03-0060. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such extension is requested and should also be charged to said Deposit Account.

Respectfully submitted,

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